FCC SAR
Measurement and Test Report

For

Bright Forward Technology Ltd.

Flat/Rm. A-1, 7/F, Mai On Industrial Building, 17-21 Kung Yip Street, Kwai Chung, NT, Hong Kong

FCC ID: 2APP9-RENDER4G

Test Standards:	FCC Part 2.1093 ANSI / IEEE C95.1 ::2005+A1:2010 ANSI / IEEE C95.3 : 2002(R2008)
Product Description:	The Exodus Render 4G
Tested Model:	4GV10018
Report No.:	STR18048163H
Max. SAR Values:	Body**: 1.196 W/kg(1g)**
Sample Received Date:	2018-04-25
Tested Date:	2018-04-25 to 2018-04-26
Issued Date:	2018-04-28
Tested By:	Lucy Wei / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager
Prepared By:	

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Note: This test report is limited to the above client company and the product model only. It

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1. General Information

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Bright Forward Technology Ltd.
Address of applicant: Flat/Rm. A-1, 7/F, Mai On Industrial Building, 17-21 Kung Yip Street, Kwai Chung, NT, Hong Kong

Manufacturer: Bright Forward Technology Ltd.
Address of manufacturer: Flat/Rm. A-1, 7/F, Mai On Industrial Building, 17-21 Kung Yip Street, Kwai Chung, NT, Hong Kong

General Description of EUT:	
Product Name:	The Exodus Render 4G
Brand Name:	Exodus Outdoor Gear
Model No.:	4GV10018
Adding Model(s):	/
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 4,13
Uplink Frequency:	FDD-LTE Band 4: Tx: 1710-1755MHz, FDD-LTE Band 13: Tx: 777-787MHz,
Downlink Frequency:	FDD-LTE Band 4: Rx: 2110-2155MHz, FDD-LTE Band 13: Tx:746-756MHz,
RF Output Power:	FDD-LTE Band 4: 23.90dBm, FDD-LTE Band 13: 23.35dBm
Type of Modulation:	QPSK, 16QAM
Antenna Type:	External Antenna
Antenna Gain:	FDD-LTE Band 4: 2.30dBi, FDD-LTE Band 13: 0.6dBi

1.2 Test Standards

The following report is prepared on behalf of the Bright Forward Technology Ltd. in accordance with FCC 47 CFR Part 2.1093, ANSI/IEEE C95.1-2005, ANSI / IEEE C95.3 :2002, KDB 447498 D01 v06, KDB 941225 D05 v02r05 , KDB 941225 D07 v01r02 ,and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02.

The objective is to determine compliance with FCC Part 2.1093 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02. The public notice KDB 447498 D01 v06 for Mobile and Portable Devices RF Exposure Procedure also.

1.4 Test Facility

FCC – Registration No.: 125990
Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

2. Summary of Test Results

The maximum results of Specific Absorption Rate (SAR) have found during testing are as follows:

Frequency Band	Body (5mm Gap) Maximum SAR_{1g} (W/kg)	SAR_{1g} Limit (W/kg)
FDD-LTE 4	**1.196**	1.6
FDD-LTE 13	0.598	1.6

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2.1093 and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2013 and KDB 865664 D01 v01r04 and KDB 865664 D02 v01r02

3. Specific Absorption Rate (SAR)

3.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techiques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = C\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific heat capacity, δ T is the temperature rise and δ t is the exposure duration, or related to the
electrical field in the tissue by

$$\mathbf{SAR} = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4. SAR Measurement System

4.1 The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

4.2 Probe

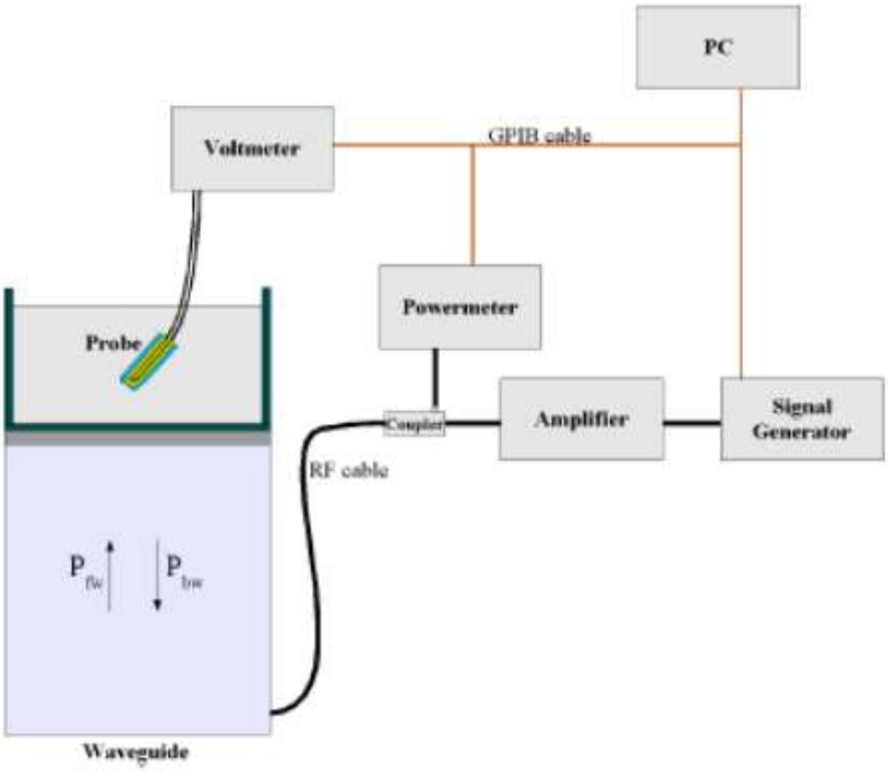
For the measurements the Specific Dosimetric E-Field Probe SSE5 SN 09/13 EP168 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Probe Length: 330 mm
- Length of Individual Dipoles: 4.5 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter : 5 mm
- Distance between dipoles / probe extremity: 2.7mm

- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.50 dB
- Calibration range: 700 to 3000MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and suface normal line:1ess than 30°

Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annexe technique using reference guide at the five frequencies.



$$SAR = \frac{4\,(P_{fw} - P_{bw})}{ab\delta} \cos^2\left(\pi \frac{y}{a}\right) e^{(2z/\delta)}$$

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b =Waveguide dimensions

I = Skin depth

Keithley configuration:

Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N) (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N)) (N=1,2,3)

where DCP is the diode compression point in mV.

4.3 Probe Calibration Process

Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm2.

Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

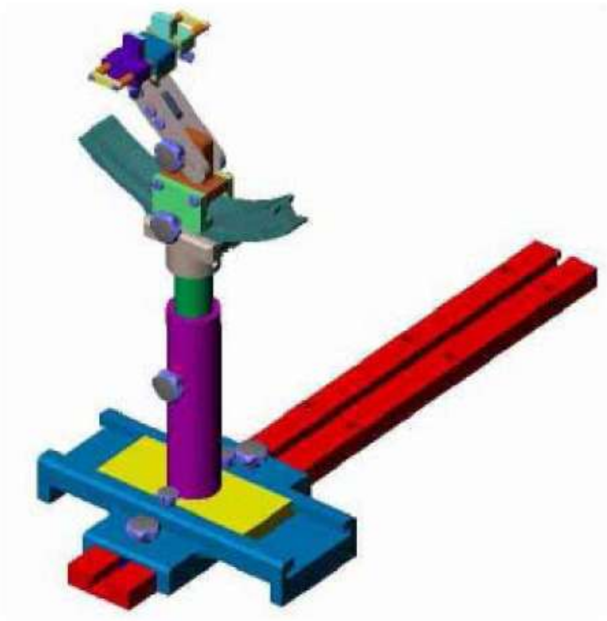
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

4.4 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

4.5 Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 °.



System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

4.6 Test Equipment List

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
E-Field Probe	MVG	SSE5	SN 09/13 EP168	2017-06-01	2018-05-31
750MHz Dipole	MVG	SID750	SN 47/12 DIP 0G750-203	2018-03-20	2019-03-19
1800MHz Dipole	MVG	SID1800	SN 47/12 DIP 1G800-206	2018-03-20	2019-03-19
Dielectric Probe Kit	MVG	SCLMP	SN 47/12 OCPG49	2018-03-20	2019-03-19
SAM Phantom	MVG	SAM	SN/ 47/12 SAM95	N/A	N/A
MULTIMETER	KEITHLEY	Keithley 2000	4006367	2017-06-12	2018-06-11
Signal Generator	Rohde & Schwarz	SMR20	100047	2017-06-12	2018-06-11
Universal Tester	Rohde & Schwarz	CMU200	112012	2017-06-12	2018-06-11
Network Analyzer	HP	8753C	2901A00831	2017-06-12	2018-06-11
Directional Couplers	Agilent	778D	20160	2017-06-12	2018-06-11

5. Tissue Simulating Liquids

5.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. Please see the following photos for the liquid height.

Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	Sugar (%)	HEC (%)	Preventol (%)	DGBE (%)
Body						
750	50.0	0.8	48.8	0.2	0.2	0
1750	70.2	0.4	0	0	0	29.4

5.2 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency (MHz)	Head		Body	
	Conductivity (σ)	Permittivity (ε_r)	Conductivity (σ)	Permittivity (ε_r)
150	0.76	52.3	0.80	61.9
300	0.87	45.3	0.92	58.2
450	0.87	43.5	0.94	56.7
750	0.89	41.9	**0.96**	**55.5**
835	0.90	41.5	0.97	55.2
900	0.97	41.5	1.05	55.0
915	0.98	41.5	1.06	55.0
1450	1.20	40.5	1.30	54.0
1610	1.29	40.3	1.40	53.8
1750	1.37	40.1	**1.49**	**53.4**
1800-2000	1.40	40.0	1.52	53.3
2450	1.80	39.2	1.95	52.7
3000	2.40	38.5	2.73	52.0
5800	5.27	35.3	6.00	48.2

5.3 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using COMOSAR Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Body Tissue Simulating Liquid									
Freq. MHz.	Temp. (℃)	Conductivity			Permittivity			Limit (%)	Date
		Reading (σ)	Target (σ)	Delta (%)	Reading (εr)	Target (εr)	Delta (%)		
750	21.2	0.92	0.96	-4.17	55.02	55.50	-0.86	±5	2018-04-25
1750	21.3	1.46	1.49	-2.01	51.22	53.40	-4.08	±5	2018-04-25

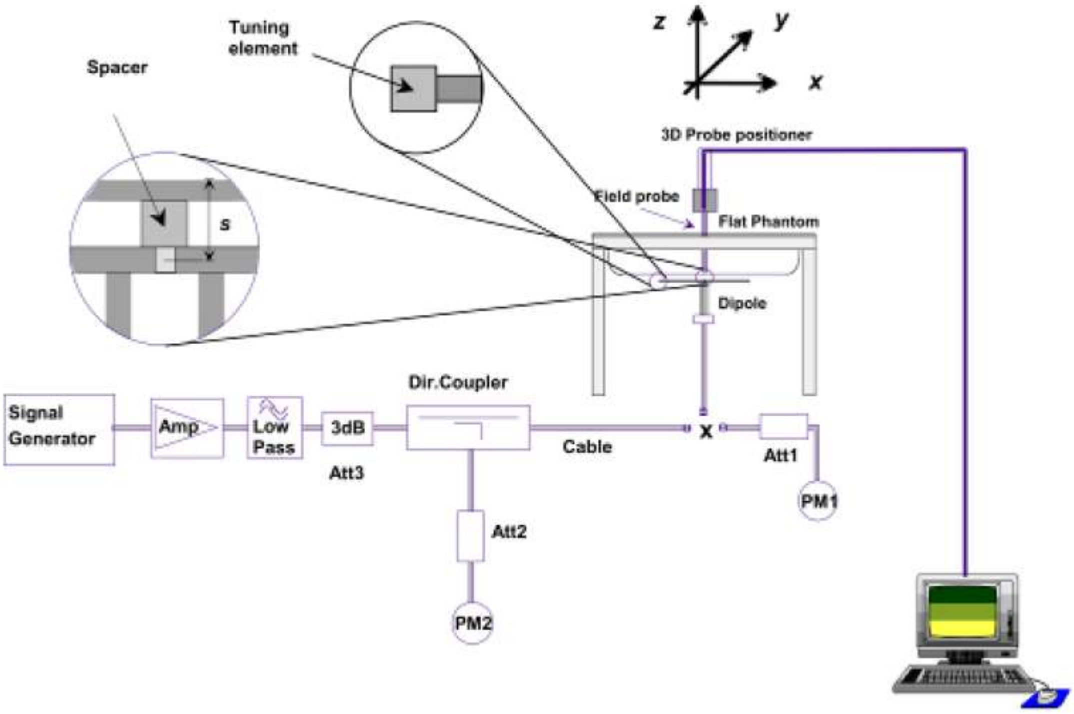
6. SAR Measurement Evaluation

6.1 Purpose of System Performance Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

6.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 750 MHz and 1800 MHz . The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom.



System Verification Setup Block Diagram

Setup Photo of Dipole Antenna

The output power on dipole port must be calibrated to 24 dBm(250 mW) before dipole is connected.

6.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. Table 6.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

Frequency	Targeted SAR_{1g}	Measured SAR_{1g}	Normalized SAR_{1g}	Tolerance
MHz	(W/kg)	(W/kg)	(W/kg)	(%)
Body				
750	8.40	2.12	8.48	0.95
1800	38.31	9.58	38.32	0.03

Remark: Referring to IEEE 1528-2013, Section 8.2, The system check shall be performed at a test frequency that is within ±10% or ±100 MHz of the compliance test mid-band frequency, so the 1750 MHz system verification is made of 1800MHz Dipole.

Targeted and Measurement SAR

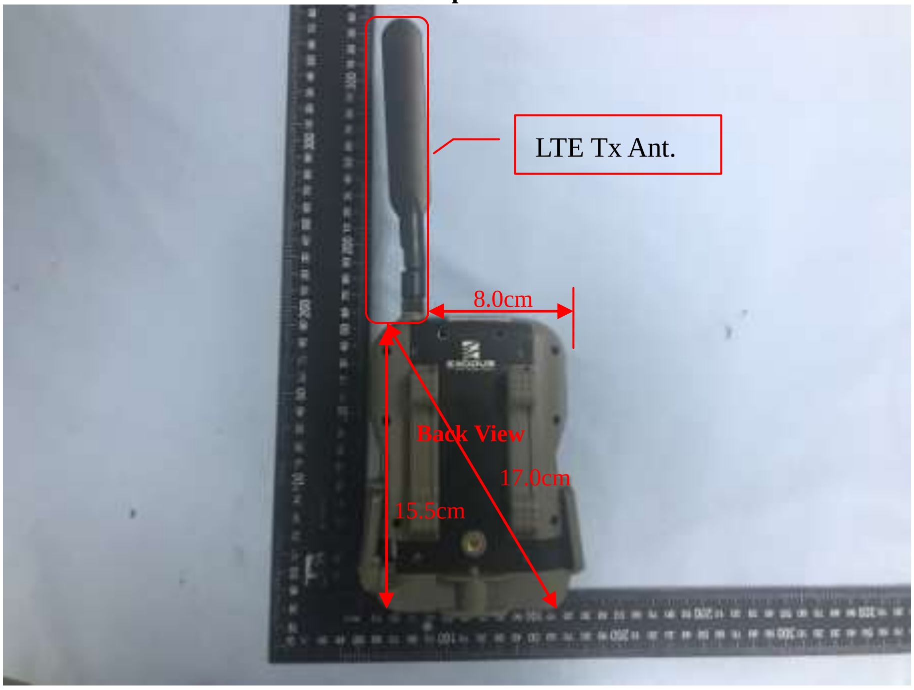
Please refer to Annex A for the plots of system performance check.

7. EUT Testing Position

7.1 EUT Antenna Position

Top Side

Right Side



Left Side

Bottom Side

Back View

Front View

Block Diagram for EUT Antenna Position

7.2EUT Testing Position

Body mode SAR assessments are required for this device. This EUT was tested in different positions for different SAR test modes, more information as below:

Body SAR tests, Test distance: 5mm						
Antennas	**Front**	**Back**	**Right Side**	**Left Side**	**Top Side**	**Bottom Side**
WWAN	No	Yes	Yes	No	Yes	No

Remark:

1. Referring to KDB 941225 D07, The test procedures are applicable to devices with a display and overall diagonal dimension ≤ 20 cm (~7.9").A composite test separation distance of 5 mm is applied to test UMPC mini-tablet transmitters and to maintain RF exposure conservativeness for the interactive operations associated with this type of devices. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

Please refer to Annex D for the EUT test setup photos.

8. SAR Measurement Procedures

8.1 Measurement Procedures

The measurement procedures are as follows:

(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.

(b) Keep EUT to radiate maximum output power or 100% factor (if applicable)

(c) Measure output power through RF cable and power meter.

(d) Place the EUT in the positions as Annex D demonstrates.

(e) Set scan area, grid size and other setting on the SATIMO software.

(f) Measure SAR results for the highest power channel on each testing position.

(g) Find out the largest SAR result on these testing positions of each band

(h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement

(b) Area scan

(c) Zoom scan

(d) Power drift measurement

8.2 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The SATIMO software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine. The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan

(b) Calculation of the SAR value at every measurement point based on all stored data

(c) Generation of a high-resolution mesh within the measured volume

(d) Interpolation of all measured values form the measurement grid to the high-resolution grid

(e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface

(f) Calculation of the averaged SAR within masses of 1g and 10g

8.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

8.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.5 SAR Averaged Methods

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10g and 1 g requires a very fine resolution in the three dimensional scanned data array.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In SATIMO measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

9. SAR Test Result

9.1 Conducted RF Output Power

FDD-LTE Band 4:

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dBm)
		Size	Offset		
QPSK	LCH	1	0	22.86	0
		1	3	22.45	0
		1	5	22.63	0
		3	0	22.46	0
		3	2	22.36	0
		3	3	22.63	0
		6	0	21.53	1
	MCH	1	0	22.32	0
		1	3	22.50	0
		1	5	22.73	0
		3	0	22.67	0
		3	2	22.74	0
		3	3	22.80	0
		6	0	21.61	1
	HCH	1	0	22.81	0
		1	3	22.64	0
		1	5	22.62	0
		3	0	22.76	0
		3	2	22.55	0
		3	3	22.41	0
		6	0	21.53	1
16QAM	LCH	1	0	22.74	1
		1	3	22.83	1
		1	5	22.54	1
		3	0	22.68	1
		3	2	22.41	1
		3	3	22.59	1
		6	0	21.29	2
	MCH	1	0	22.65	1
		1	3	22.80	1
		1	5	22.58	1
		3	0	22.39	1
		3	2	22.34	1
		3	3	22.20	1

		6	0	21.16	2
	HCH	1	0	21.46	1
		1	3	21.47	1
		1	5	21.28	1
		3	0	21.35	1
		3	2	21.48	1
		3	3	21.35	1
		6	0	20.64	2

Channel Bandwidth: 3 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.12	0
		1	7	22.81	0
		1	14	23.05	0
		8	0	22.06	1
		8	4	22.03	1
		8	7	21.97	1
		15	0	21.82	1
	MCH	1	0	23.04	0
		1	7	22.86	0
		1	14	22.99	0
		8	0	21.94	1
		8	4	22.07	1
		8	7	22.00	1
		15	0	22.02	1
	HCH	1	0	22.29	0
		1	7	22.39	0
		1	14	22.63	0
		8	0	21.46	1
		8	4	21.47	1
		8	7	21.46	1
		15	0	21.39	1
16QAM	LCH	1	0	22.46	1
		1	7	22.22	1
		1	14	22.57	1
		8	0	21.37	2
		8	4	21.36	2
		8	7	21.00	2
		15	0	20.87	2
	MCH	1	0	22.35	1
		1	7	22.19	1
		1	14	22.39	1

		8	0	20.84	2
		8	4	20.85	2
		8	7	20.71	2
		15	0	21.14	2
	HCH	1	0	21.71	1
		1	7	21.77	1
		1	14	21.83	1
		8	0	20.97	2
		8	4	20.98	2
		8	7	20.34	2
		15	0	20.39	2

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.91	0
		1	12	22.67	0
		1	24	22.75	0
		12	0	21.83	1
		12	6	21.73	1
		12	13	21.83	1
		25	0	21.77	1
	MCH	1	0	22.72	0
		1	12	22.80	0
		1	24	23.12	0
		12	0	21.80	1
		12	6	21.83	1
		12	13	21.90	1
		25	0	21.83	1
	HCH	1	0	22.63	0
		1	12	22.53	0
		1	24	22.90	0
		12	0	21.36	1
		12	6	21.27	1
		12	13	21.56	1
		25	0	21.38	1
16QAM	LCH	1	0	22.13	1
		1	12	21.76	1
		1	24	22.08	1
		12	0	21.02	2
		12	6	20.89	2
		12	13	20.94	2
		25	0	20.77	2

	MCH	1	0	22.14	1
		1	12	22.22	1
		1	24	22.27	1
		12	0	20.98	2
		12	6	21.02	2
		12	13	21.23	2
		25	0	20.91	2
	HCH	1	0	21.54	1
		1	12	21.63	1
		1	24	21.99	1
		12	0	20.34	2
		12	6	20.36	2
		12	13	20.64	2
		25	0	20.32	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.99	0
		1	24	22.80	0
		1	49	22.68	0
		25	0	21.81	1
		25	12	21.58	1
		25	25	21.66	1
		50	0	21.67	1
	MCH	1	0	22.92	0
		1	24	22.97	0
		1	49	23.04	0
		25	0	21.79	1
		25	12	21.91	1
		25	25	21.91	1
		50	0	21.80	1
	HCH	1	0	22.46	0
		1	24	22.19	0
		1	49	22.61	0
		25	0	21.49	1
		25	12	21.42	1
		25	25	21.39	1
		50	0	21.34	1
16QAM	LCH	1	0	21.98	1
		1	24	21.68	1
		1	49	21.68	1
		25	0	20.86	2

		25	12	20.66	2
		25	25	20.67	2
		50	0	20.66	2
	MCH	1	0	22.38	1
		1	24	22.68	1
		1	49	22.59	1
		25	0	20.74	2
		25	12	20.86	2
		25	25	20.91	2
		50	0	20.86	2
	HCH	1	0	21.98	1
		1	24	21.75	1
		1	49	22.01	1
		25	0	20.59	2
		25	12	20.51	2
		25	25	20.45	2
		50	0	20.36	2

Channel Bandwidth: 15 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.97	0
		1	37	22.63	0
		1	74	22.61	0
		37	0	21.68	1
		37	18	21.49	1
		37	38	21.51	1
		75	0	21.59	1
	MCH	1	0	22.65	0
		1	37	22.68	0
		1	74	22.78	0
		37	0	21.64	1
		37	18	21.77	1
		37	38	21.82	1
		75	0	21.71	1
	HCH	1	0	22.52	0
		1	37	22.23	0
		1	74	22.31	0
		37	0	21.47	1
		37	18	21.25	1
		37	38	21.31	1
		75	0	21.39	1
16QAM	LCH	1	0	22.07	1

		1	37	21.71	1
		1	74	21.76	1
		37	0	20.45	2
		37	18	20.39	2
		37	38	20.40	2
		75	0	20.67	2
	MCH	1	0	21.94	1
		1	37	22.14	1
		1	74	22.25	1
		37	0	20.59	2
		37	18	20.79	2
		37	38	20.78	2
		75	0	20.88	2
	HCH	1	0	22.29	1
		1	37	21.79	1
		1	74	22.02	1
		37	0	20.50	2
		37	18	20.32	2
		37	38	20.35	2
		75	0	20.38	2

Channel Bandwidth: 20 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	23.87	0
		1	49	23.90	0
		1	99	23.55	0
		50	0	23.80	0
		50	25	23.67	0
		50	50	23.57	0
		100	0	23.43	0
	MCH	1	0	23.37	0
		1	49	23.55	0
		1	99	23.43	0
		50	0	23.46	0
		50	25	23.52	0
		50	50	23.48	0
		100	0	22.17	0
	HCH	1	0	23.48	0
		1	49	23.67	0
		1	99	23.56	0
		50	0	23.45	0
		50	25	23.50	0

		50	50	23.39	0
		100	0	22.52	0
16QAM	LCH	1	0	21.34	1
		1	49	21.25	1
		1	99	21.22	1
		50	0	20.51	2
		50	25	20.39	2
		50	50	20.60	2
		100	0	20.73	2
	MCH	1	0	21.22	1
		1	49	21.13	1
		1	99	21.21	1
		50	0	20.57	2
		50	25	20.70	2
		50	50	20.86	2
		100	0	20.59	2
	HCH	1	0	21.72	1
		1	49	21.31	1
		1	99	21.38	1
		50	0	20.78	2
		50	25	20.52	2
		50	50	20.39	2
		100	0	20.52	2

FDD-LTE Band 13:

Channel Bandwidth: 5 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	1	0	22.50	0
		1	12	22.62	0
		1	24	22.94	0
		12	0	21.75	1
		12	6	21.68	1
		12	13	21.90	1
		25	0	21.74	1
	MCH	1	0	22.59	0
		1	12	23.05	0
		1	24	23.08	0
		12	0	21.69	1
		12	6	21.94	1
		12	13	21.89	1
		25	0	21.64	1
	HCH	1	0	22.75	0
		1	12	23.11	0
		1	24	23.04	0
		12	0	21.74	1
		12	6	21.99	1
		12	13	21.94	1
		25	0	21.72	1
16QAM	LCH	1	0	21.89	1
		1	12	21.7	1
		1	24	21.94	1
		12	0	20.98	2
		12	6	20.76	2
		12	13	20.85	2
		25	0	20.71	2
	MCH	1	0	21.21	1
		1	12	21.35	1
		1	24	21.61	1
		12	0	20.59	2
		12	6	20.92	2
		12	13	20.87	2
		25	0	20.67	2
	HCH	1	0	21.12	1
		1	12	21.75	1
		1	24	21.66	1

		12	0	20.73	2
		12	6	21.00	2
		12	13	20.99	2
		25	0	20.86	2

Channel Bandwidth: 10 MHz					
Modulation	Channel	RB Configuration		Average Power [dBm]	MPR (dB)
		Size	Offset		
QPSK	LCH	/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
	MCH	1	0	22.52	0
		1	24	22.93	0
		1	49	23.35	0
		25	0	22.76	1
		25	12	22.54	1
		25	25	22.22	1
		50	0	22.60	1
	HCH	/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
16QAM	LCH	/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
	MCH	1	0	21.40	1
		1	24	22.14	1
		1	49	22.60	1
		25	0	20.43	2
		25	12	20.53	2
		25	25	20.79	2
		50	0	20.39	2

	HCH	/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/
		/	/	/	/

Remark:

1. Per KDB941225 D05 v02r05, Start with the largest channel bandwidth then measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle, and lower edge of each required test channel. When the reported SAR is≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. 6 When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2. Per KDB941225 D05 v02r05, The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.
3. Per KDB941225 D05 v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations, and the highest reported SAR for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB941225 D05 v02r05, For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in 5.2.1, 5.2.2, and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

9.2 Test Results for Standalone SAR Test

Body SAR_ Antenna 90 degree to the EUT

LTE Band 4–Body SAR Test (Gap: 5mm)								
Plot No.	Mode Modulation, Bandwidth, RB	Test Position Body	Frequency MHz	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
1.	RMC QPSK 20MHz 1RB	Back Side	1720.0	23.90	24.0	1.023	0.357	0.365
2.	RMC QPSK 20MHz 1RB	Top side	1720.0	23.90	24.0	1.023	1.169	1.196
3.	RMC QPSK 20MHz 1RB	Top side	1732.5	23.55	24.0	1.109	1.012	1.122
4.	RMC QPSK 20MHz 1RB	Top side	1745.0	23.67	24.0	1.079	0.986	1.064
5.	RMC QPSK 20MHz 1RB	Right side	1720.0	23.90	24.0	1.023	0.039	0.040
6.	RMC QPSK 20MHz 50%RB	Back Side	1720.0	23.80	24.0	1.047	0.293	0.307
7.	RMC QPSK 20MHz 50%RB	Top side	1720.0	23.80	24.0	1.047	1.027	1.075
8.	RMC QPSK 20MHz 50%RB	Top side	1732.5	23.52	24.0	1.117	0.963	1.076
9.	RMC QPSK 20MHz 50%RB	Top side	1745.0	23.50	24.0	1.122	0.872	0.978
10.	RMC QPSK 20MHz 50%RB	Right side	1720.0	23.80	24.0	1.047	0.012	0.013
11.	RMC QPSK 20MHz 100%RB	Top side	1720.0	23.43	24.0	1.140	0.685	0.781
12.	RMC QPSK 20MHz 1RB	Top side	1720.0	23.90	24.0	1.023	0.982	1.005

LTE Band 13–Body SAR Test (Gap: 5mm)								
Plot No.	Mode Modulation, Bandwidth, RB	Test Position Body	Frequency MHz	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
13.	RMC QPSK 10MHz 1RB	Back Side	782.0	23.35	24.0	1.161	0.155	0.180
14.	RMC QPSK 10MHz 1RB	Top side	782.0	23.35	24.0	1.161	0.515	0.598
15.	RMC QPSK 10MHz 1RB	Right side	782.0	23.35	24.0	1.161	0.057	0.066
16.	RMC QPSK 10MHz 50%RB	Back Side	782.0	22.76	23.0	1.057	0.132	0.139
17.	RMC QPSK 10MHz 50%RB	Top side	782.0	22.76	23.0	1.057	0.431	0.455
18.	RMC QPSK 10MHz 50%RB	Right side	782.0	22.76	23.0	1.057	0.046	0.049

Remark: Per KDB 447498 D01 v06, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

Body SAR_ Antenna 0 degree to the EUT

LTE Band 4–Body SAR Test (Gap: 5mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
19.	RMC QPSK 20MHz 1RB	Back Side	1720.0	23.90	24.0	1.023	0.154	0.158
20.	RMC QPSK 20MHz 1RB	Top side	1720.0	23.90	24.0	1.023	0.076	0.078
21.	RMC QPSK 20MHz 1RB	Right side	1720.0	23.90	24.0	1.023	0.192	0.196
22.	RMC QPSK 20MHz 50%RB	Back Side	1720.0	23.80	24.0	1.047	0.121	0.127
23.	RMC QPSK 20MHz 50%RB	Top side	1720.0	23.80	24.0	1.047	0.052	0.054
24.	RMC QPSK 20MHz 50%RB	Right side	1720.0	23.80	24.0	1.047	0.148	0.155

LTE Band 13–Body SAR Test (Gap: 5mm)								
Plot No.	Mode	Test Position Body	Frequency	Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
	Modulation, Bandwidth, RB		MHz					
25.	RMC QPSK 10MHz 1RB	Back Side	782.0	23.35	24.0	1.161	0.094	0.109
26.	RMC QPSK 10MHz 1RB	Top side	782.0	23.35	24.0	1.161	0.022	0.026
27.	RMC QPSK 10MHz 1RB	Right side	782.0	23.35	24.0	1.161	0.183	0.213
28.	RMC QPSK 10MHz 50%RB	Back Side	782.0	22.76	23.0	1.057	0.042	0.044
29.	RMC QPSK 10MHz 50%RB	Top side	782.0	22.76	23.0	1.057	0.011	0.012
30.	RMC QPSK 10MHz 50%RB	Right side	782.0	22.76	23.0	1.057	0.146	0.154

10. Measurement Uncertainty

10.1 Uncertainty for EUT SAR Test

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions – Noise	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5	5.0	R	√3	1	1	2.89	2.89	∝
Test Sample Related									
Test sample positioning	E.4.2	0.03	N	1	1	1	0.03	0.03	N–1
Device Holder Uncertainty	E.4.1	5.00	N	1	1	1	5.00	5.00	
Output power Variation - SAR drift measurement	E.2.9	12.02	R	√3	1	1	6.94	6.94	∝
SAR scaling	E6.5	0.0	R	√3	1	1	0.0	0.0	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	1.9	R	√3	1	0.84	1.10	0.90	∝
Liquid conductivity - deviation	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	∝

from target value									
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	∝
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	∝
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	∝
Combined Standard Uncertainty			RSS				12.98	12.53	
Expanded Uncertainty (95% Confidence interval)			K=2				25.32	24.43	

10.2 Uncertainty for System Performance Check

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Modulation response	E.2.5	0	R	√3	0	0	0.0	0.0	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions – Noise	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
RF ambient Conditions - Reflections	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max.	E.5.2	5.0	R	√3	1	1	2.89	2.89	∝

SAR Evaluation									
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	√3	1	1	0.58	0.58	N−1
Input power and SAR drift measurement	8,6.6.2	12.02	R	√3	1	1	6.94	6.94	∝
Deviation of experimental dipole from numerical dipole	E.6.4	5.5	R	√3	1	1	3.20	3.20	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Uncertainty in SAR correction for deviations in permittivity and conductivity	E3.2	2.0	R	√3	1	0.84	1.10	1.10	∝
Liquid conductivity - deviation from target value	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M
Combined Standard Uncertainty			RSS				12.00	11.50	
Expanded Uncertainty (95% Confidence interval)			K=2				23.39	22.43	

Annex A. Plots of System Performance Check

MEASUREMENT 2

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 04/25/2018

Measurement duration: 12 minutes 21 seconds

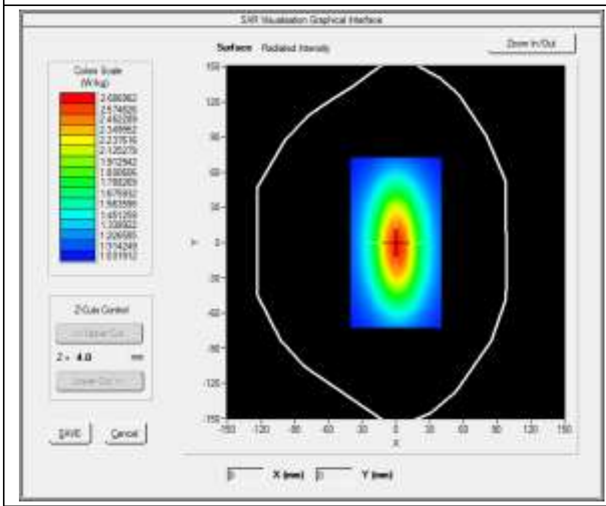
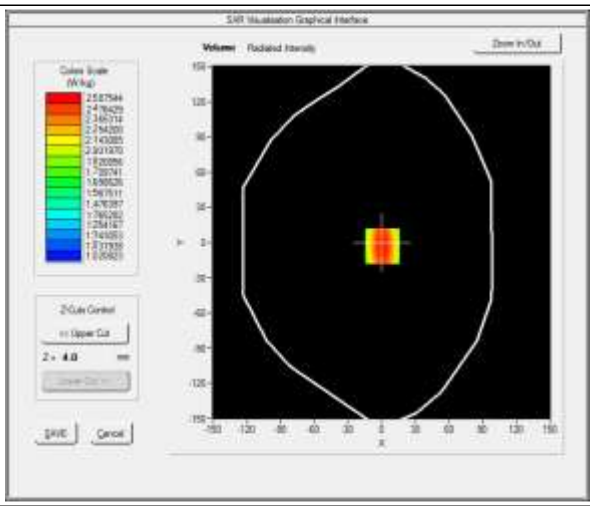
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.28; Calibrated: 06/01/2017

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	750.000000
Relative Permittivity (real part)	55.021446
Conductivity (S/m)	0.921083
Power Variation (%)	0.164763
Ambient Temperature	21.1
Liquid Temperature	21.3

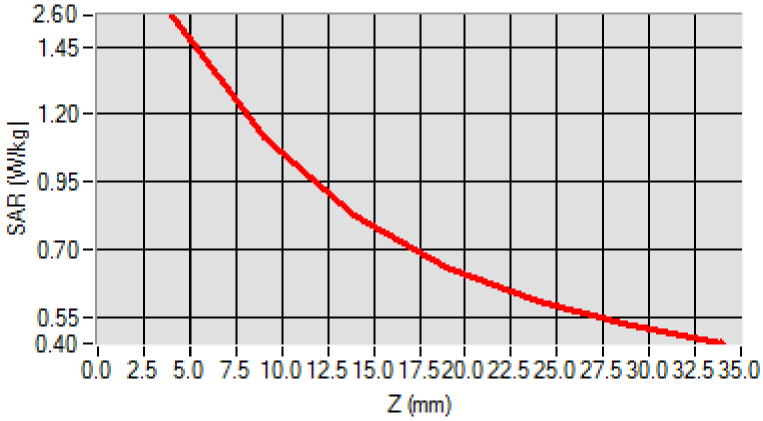
SURFACE SAR	VOLUME SAR
	

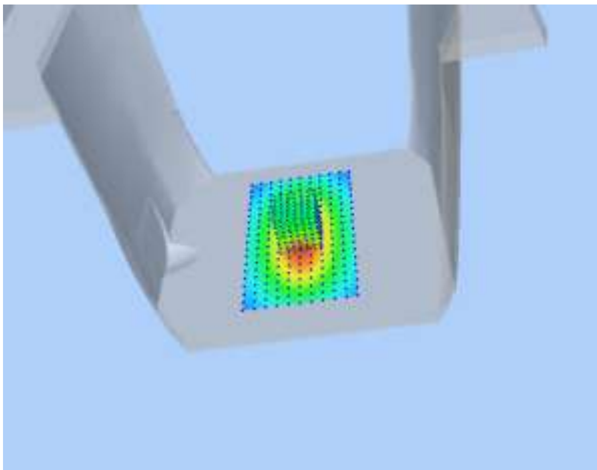
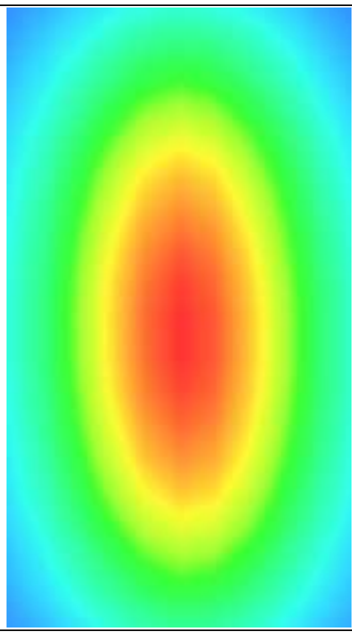
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	**1.000922**
SAR 1g (W/Kg)	**2.122639**

Z Axis Scan

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**	**24.00**	**29.00**
SAR (W/Kg)	**0.0000**	**2.5146**	**1.1080**	**0.8221**	**0.5176**	**0.4878**	**0.4872**



3D screen shot	**Hot spot position**
	

MEASUREMENT 9

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 04/25/2018

Measurement duration: 12 minutes 21 seconds

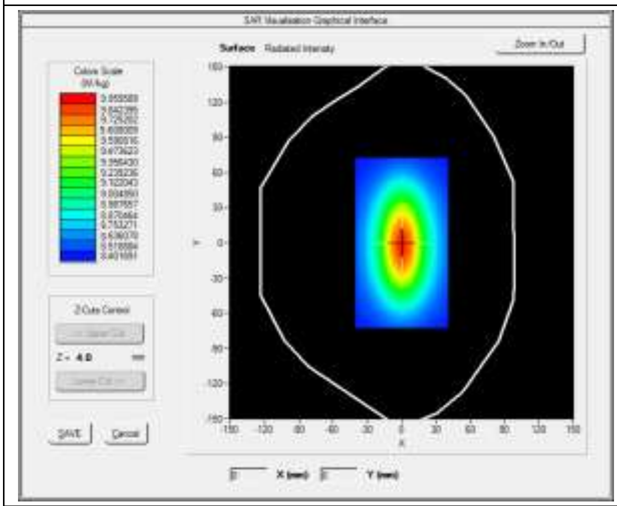
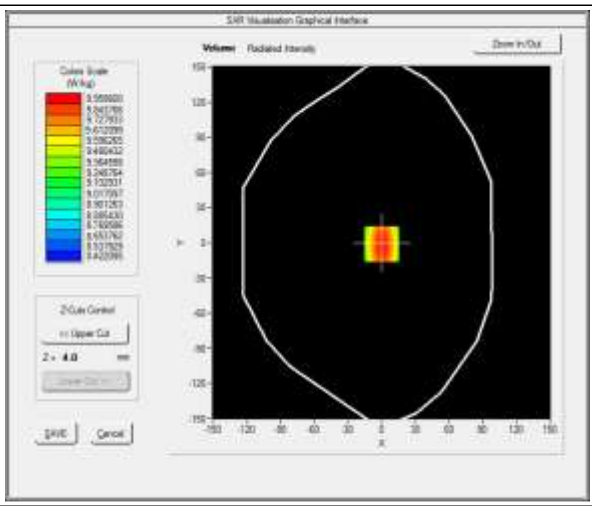
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.06; Calibrated: 06/01/2017

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative Permittivity (real part)	51.224510
Conductivity (S/m)	1.461261
Power Variation (%)	0.845690
Ambient Temperature	21.1
Liquid Temperature	21.2

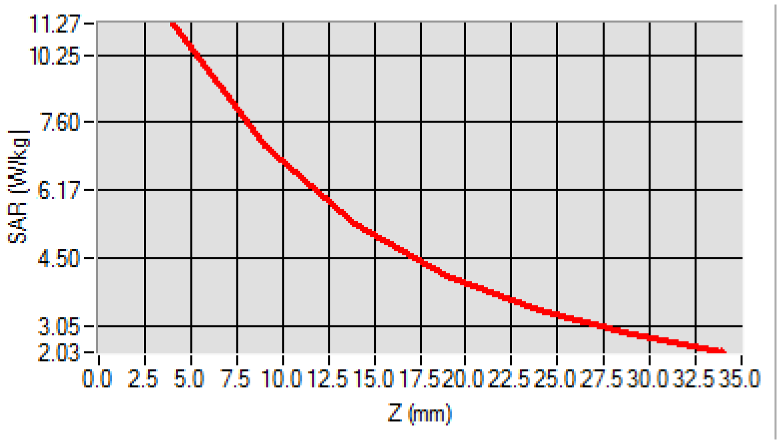
SURFACE SAR	**VOLUME SAR**
	

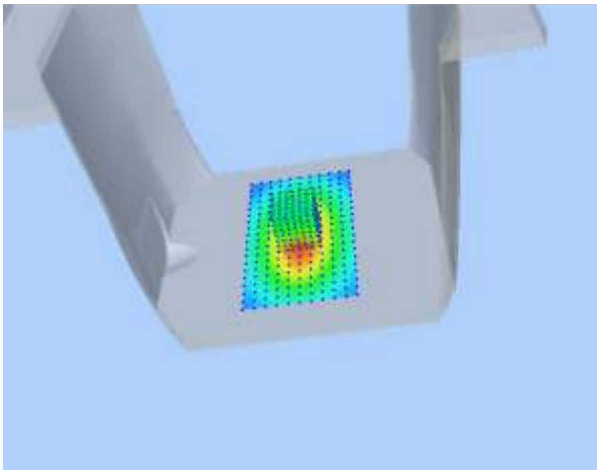
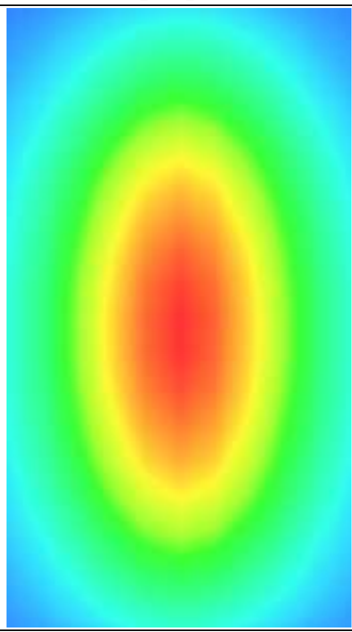
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.221202
SAR 1g (W/Kg)	9.582560

Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.0000	11.2425	9.4123	8.0345	6.9125	6.3092	3.9460



3D screen shot	Hot spot position
	

Annex B. Plots of SAR Measurement

Body SAR_ Antenna 90 degree to the EUT

TYPE	BAND	PARAMETERS
Phone	**LTE Band 4_RMC**	Measurement 2: Flat Plane with Top device position on Low Channel in LTE mode
Phone	**LTE Band 13_RMC**	Measurement 14: Flat Plane with Top device position on Middle Channel in LTE mode
Remark: SAR plot is showed the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.		

Body SAR_Antenna 0 degree to the EUT

TYPE	BAND	PARAMETERS
Phone	**LTE Band 4_RMC**	Measurement 21: Flat Plane with Right device position on Low Channel in LTE mode
Phone	**LTE Band 13_RMC**	Measurement 27: Flat Plane with Right device position on Middle Channel in LTE mode
Remark: SAR plot is showed the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.		

MEASUREMENT 2

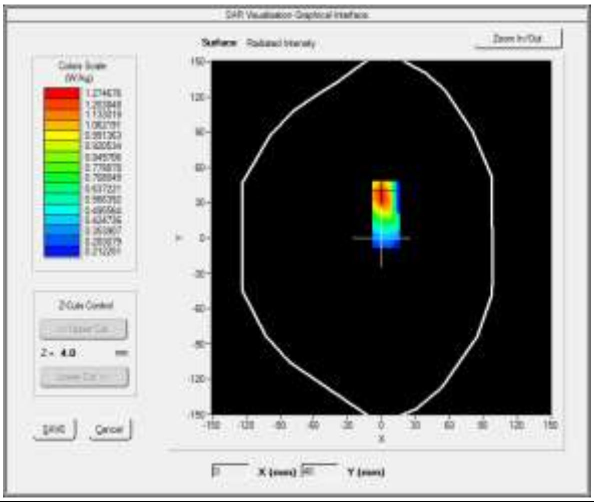
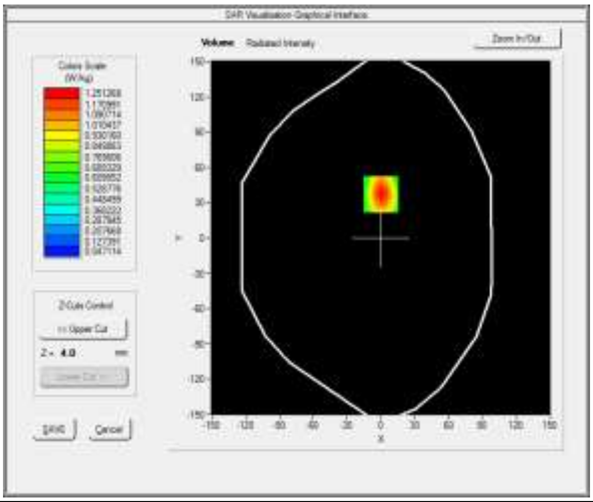
Type: Phone measurement (Complete)
Date of measurement: 04/25/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.06; Calibrated: 06/01/2017

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Top
Band	LTE Band 4_RMC
Channels	QPSK, 20MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1720.000000
Relative Permittivity (real part)	51.224510
Conductivity (S/m)	1.461261
Power Variation (%)	0.858383
Ambient Temperature	21.1
Liquid Temperature	21.2

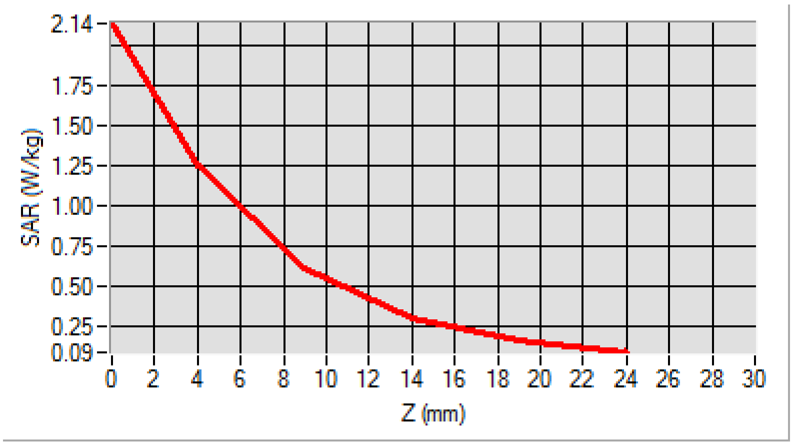
SURFACE SAR	VOLUME SAR
	

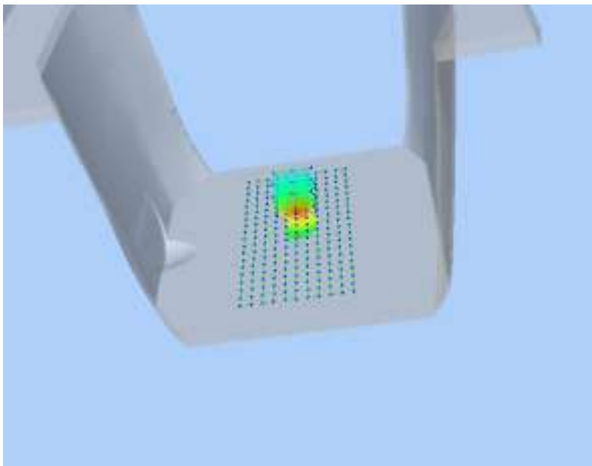
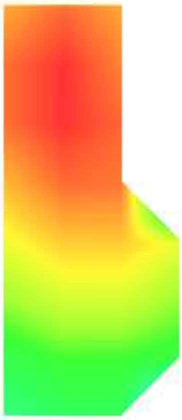
Maximum location: X=0.00, Y=37.00

SAR Peak: 2.14 W/kg

SAR 10g (W/Kg)	0.605589
SAR 1g (W/Kg)	1.168521

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.1422	1.2513	0.6083	0.2960	0.1569



3D screen shot	Hot spot position
	

MEASUREMENT 14

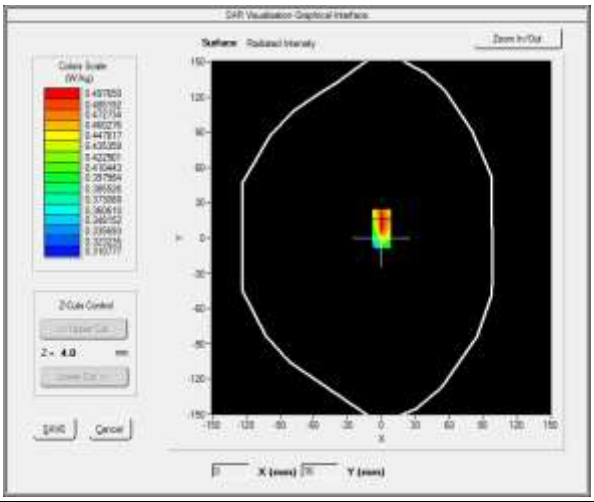
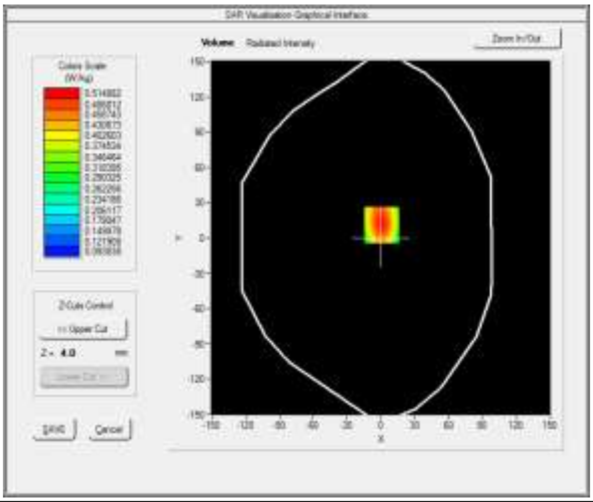
Type: Phone measurement (Complete)
Date of measurement: 04/25/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.28; Calibrated: 06/01/2017

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Top
Band	LTE Band 13_RMC
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	782.000000
Relative Permittivity (real part)	55.021446
Conductivity (S/m)	0.921083
Power Variation (%)	3.607542
Ambient Temperature	21.1
Liquid Temperature	21.2

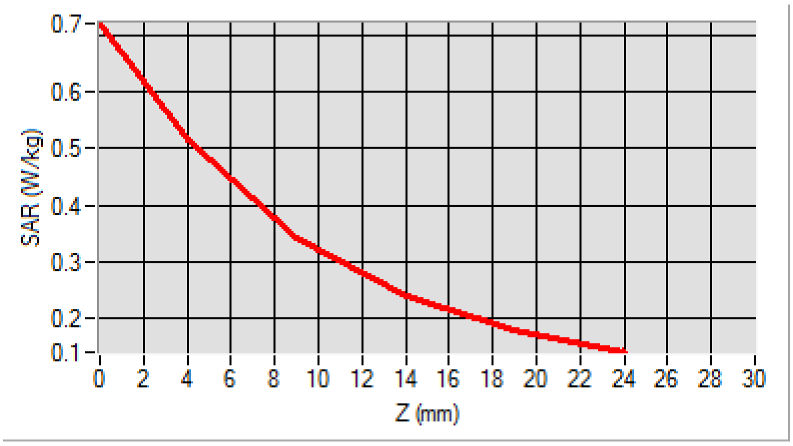
SURFACE SAR	**VOLUME SAR**
	

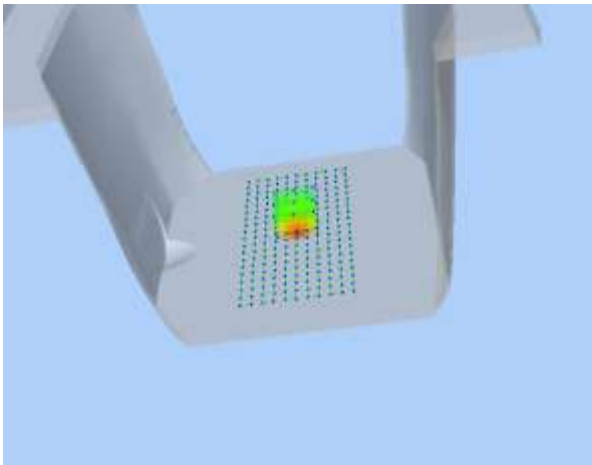
Maximum location: X=1.00, Y=11.00

SAR Peak: 0.72 W/kg

SAR 10g (W/Kg)	**0.338092**
SAR 1g (W/Kg)	**0.515241**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.7198**	**0.5149**	**0.3430**	**0.2401**	**0.1810**



3D screen shot	**Hot spot position**
	

MEASUREMENT 21

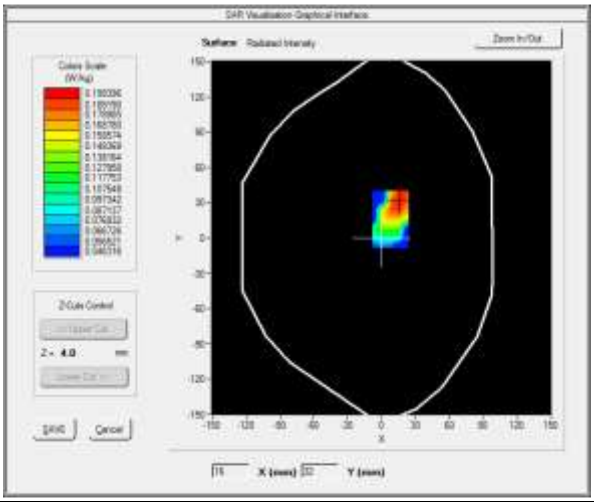
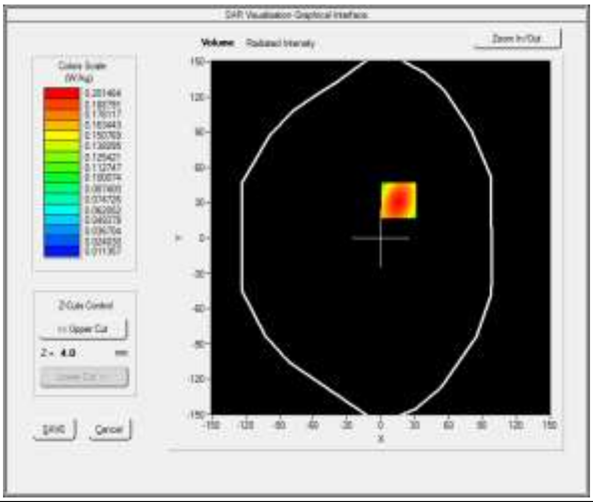
Type: Phone measurement (Complete)
Date of measurement: 04/25/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.06; Calibrated: 06/01/2017

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Right
Band	LTE Band 4_RMC
Channels	QPSK, 20MHz, 1RB, Low
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	1720.000000
Relative Permittivity (real part)	51.224510
Conductivity (S/m)	1.461261
Power Variation (%)	0.964323
Ambient Temperature	21.1
Liquid Temperature	21.2

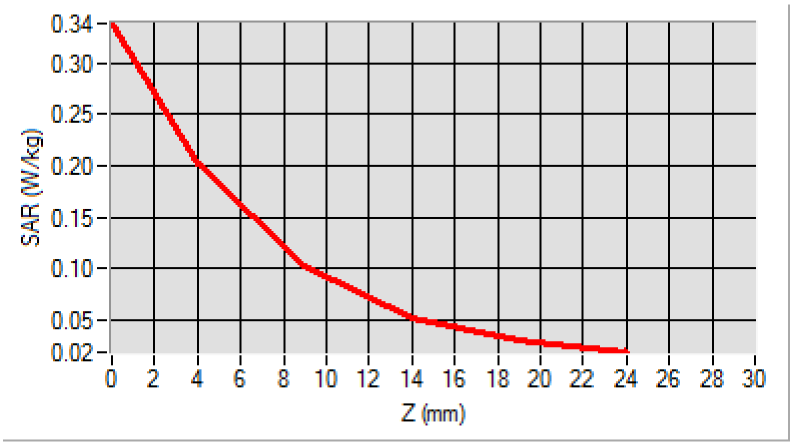
SURFACE SAR	VOLUME SAR
	

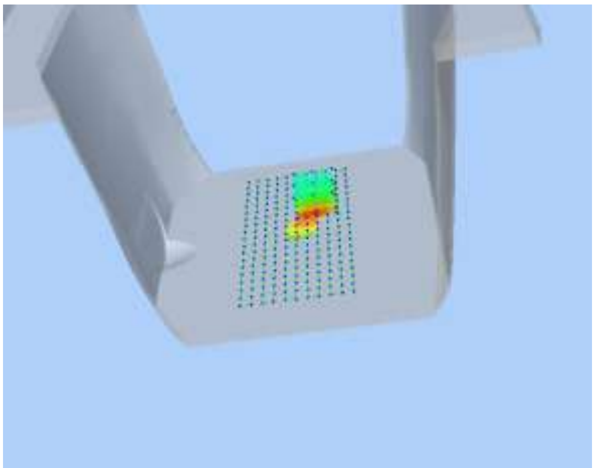
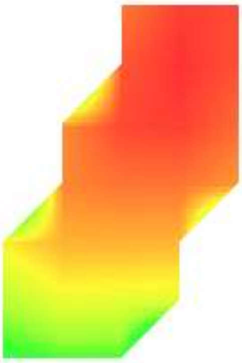
Maximum location: X=16.00, Y=32.00

SAR Peak: 0.34 W/kg

SAR 10g (W/Kg)	0.107028
SAR 1g (W/Kg)	0.191656

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3388	0.2015	0.1014	0.0522	0.0300



3D screen shot	Hot spot position
	

MEASUREMENT 27

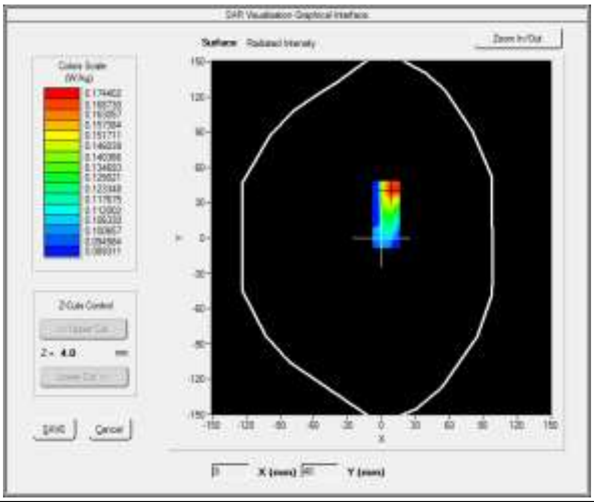
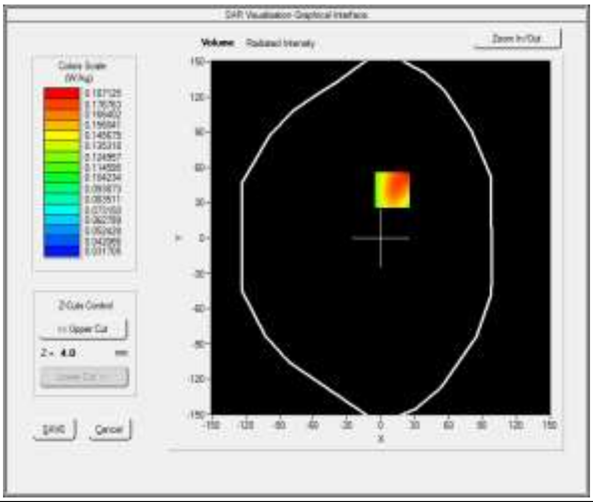
Type: Phone measurement (Complete)
Date of measurement: 04/25/2018
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 7.28; Calibrated: 06/01/2017

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Zoom Scan	dx=8mm dy=8mm dz=5mm
Phantom	Flat Plane
Device Position	Right
Band	LTE Band 13_RMC
Channels	QPSK, 10MHz, 1RB, Middle
Signal	Duty Cycle 1:1

B. SAR Measurement Results

Frequency (MHz)	782.000000
Relative Permittivity (real part)	55.021446
Conductivity (S/m)	0.921083
Power Variation (%)	3.126754
Ambient Temperature	21.1
Liquid Temperature	21.2

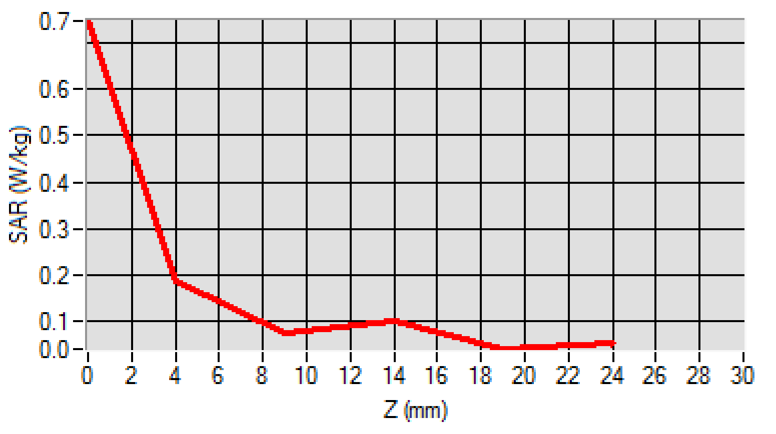
SURFACE SAR	VOLUME SAR
	

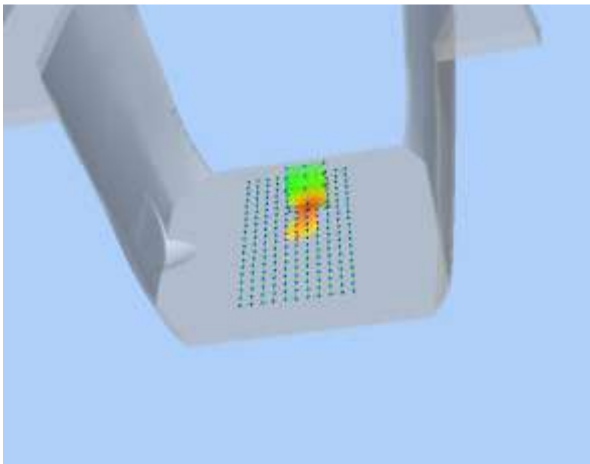
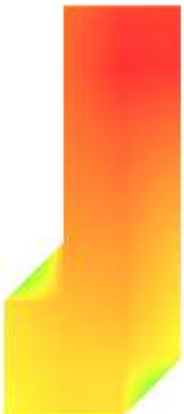
Maximum location: X=10.00, Y=41.00

SAR Peak: 0.24 W/kg

SAR 10g (W/Kg)	**0.124560**
SAR 1g (W/Kg)	**0.183181**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.7480**	**0.1871**	**0.0760**	**0.0980**	**0.0395**



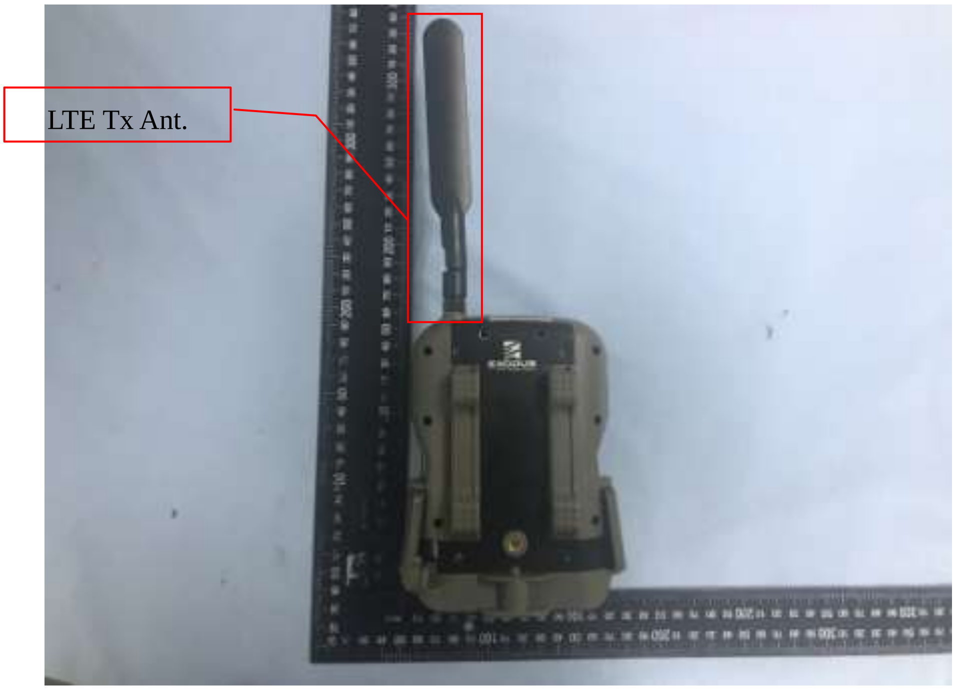
3D screen shot	**Hot spot position**
	

Annex C. EUT Photos

EUT View Front

EUT View Back

Antenna View

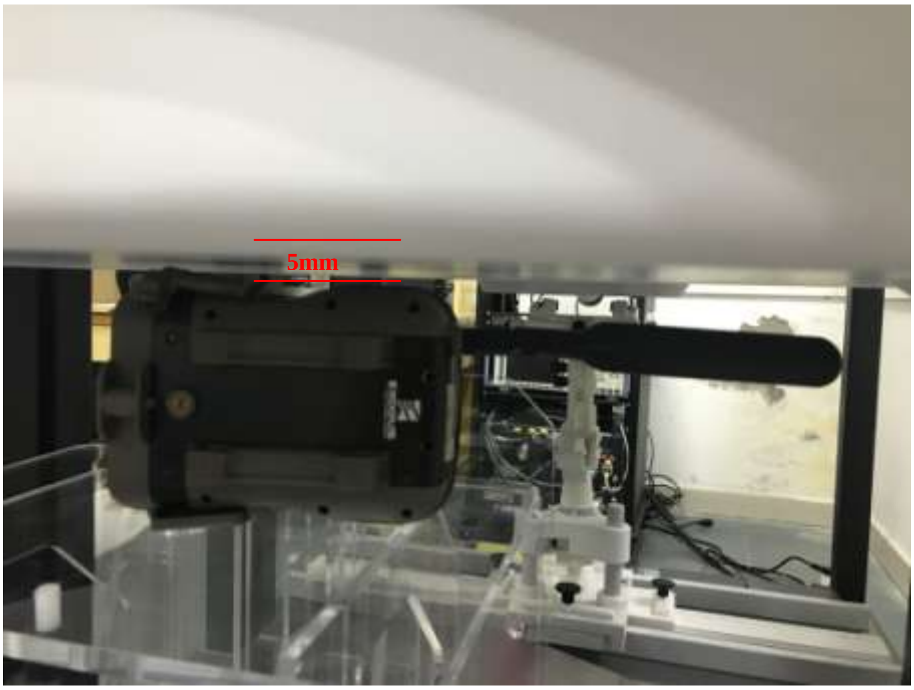


Annex D. Test Setup Photos

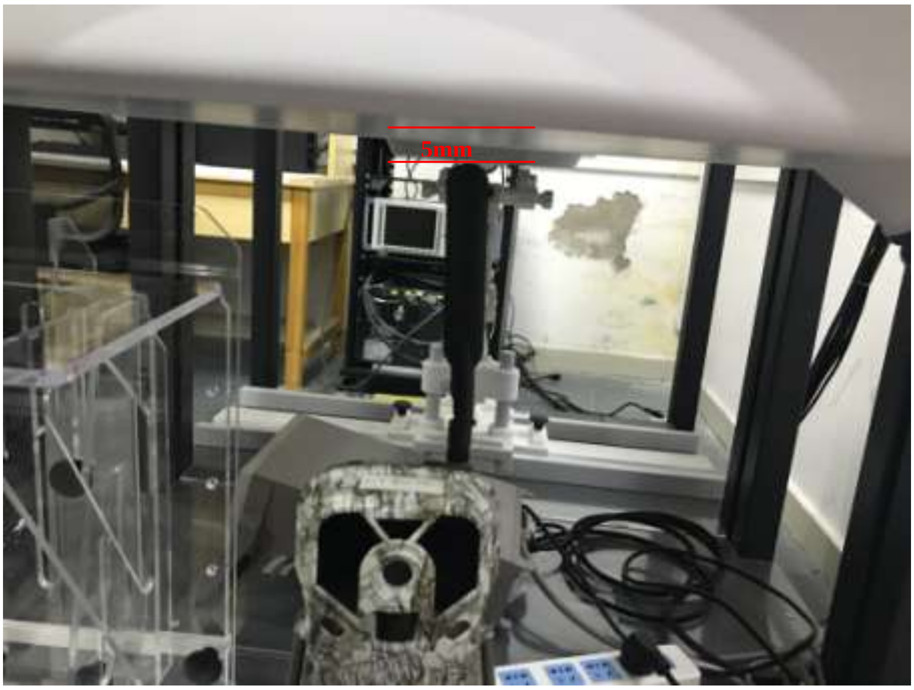
Body mode Exposure Conditions_ Antenna 0 degree to the EUT

Body Back

Body Right



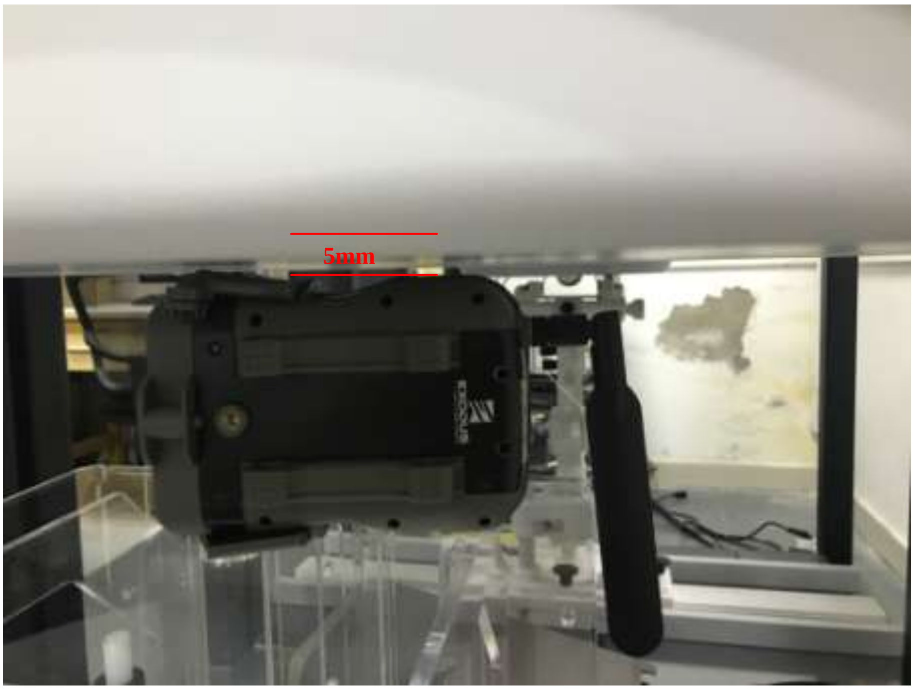
Body Top



Body mode Exposure Conditions_Antenna 90 degree to the EUT

Body Back

Body Right



Body Top

Annex E. Calibration Certificate

Please refer to the exhibit for the calibration certificate

******* END OF REPORT *******